(1) Statistical randomness;

(2) Unpredictability; and

(3) Non-repeatability.

(b) *Statistical randomness*. (1) Numbers or other designations produced by an RNG must be statistically random individually and in the permutations and combinations used in the application under the rules of the game. For example, if a bingo game with 75 objects with numbers or other designations has a progressive winning pattern of the five numbers or other designations on the bottom of the card, and the winning of this prize is defined to be the five numbers or other designations that are matched in the first five objects drawn, the likelihood of each of the 75C5 combinations are to be verified to be statistically equal.

(2) Numbers or other designations produced by an RNG must pass the statistical tests for randomness to a 99% confidence level, which may include:

(i) Chi-square test;

(ii) Runs test (patterns of occurrences must not be recurrent); and

(iii) Serial correlation test potency and degree of serial correlation (outcomes must be independent from the previous game).

(iv) Equi-distribution (frequency) test;

(v) Gap test;

(vi) Poker test;

(vii) Coupon collector's test;

(viii) Permutation test;

(ix) Spectral test; or

(x) Test on subsequences.

(c) *Unpredictability*. (1) It must not be feasible to predict future outputs of an RNG, even if the algorithm and the past sequence of outputs are known.

(2) Unpredictability must be ensured by reseeding or by continuously cycling the RNG, and by providing a sufficient number of RNG states for the applications supported.

(3) Re-seeding may be used where the re-seeding input is at least as statistically random as, and independent of, the output of the RNG being re-seeded.

(d) *Non-repeatability*. The RNG may not be initialized to reproduce the same output stream that it has produced before, nor may any two instances of an RNG produce the same stream as each other. This property must be ensured by initial seeding that comes from:

(1) A source of ''true'' randomness, such as a hardware random noise generator; or

(2) A combination of timestamps, parameters unique to a Class II gaming system, previous RNG outputs, or other, similar method.

(e) *General requirements*. (1) Software that calls an RNG to derive game outcome events must immediately use the output returned in accordance with the game rules.

(2) The use of multiple RNGs is permitted as long as they operate in accordance with this section.

(3) RNG outputs must not be arbitrarily discarded or selected.

(4) Where a sequence of outputs is required, the whole of the sequence in the order generated must be used in accordance with the game rules.

(5) The Class II gaming system must neither adjust the RNG process or game outcomes based on the history of prizes obtained in previous games nor use any reflexive software or secondary decision that affects the results shown to the player or game outcome.

(f) *Scaling algorithms and scaled numbers*. An RNG that provides output scaled to given ranges must:

(1) Be independent and uniform over the range;

(2) Provide numbers scaled to the ranges required by game rules, and notwithstanding the requirements of paragraph (e)(3) of this section, may discard numbers that do not map uniformly onto the required range but must use the first number in sequence that does map correctly to the range;

(3) Be capable of producing every possible outcome of a game according to its rules; and

(4) Use an unbiased algorithm. A scaling algorithm is considered to be unbiased if the measured bias is no greater than 1 in 50 million.

§ 547.15 What are the minimum technical standards for electronic data communications between system components?

(a) *Sensitive data*. Communication of sensitive data must be secure from eavesdropping, access, tampering, intrusion or alteration unauthorized by

the TGRA. Sensitive data includes, but is not limited to:

(1) RNG seeds and outcomes;

(2) Encryption keys, where the implementation chosen requires transmission of keys;

(3) PINs;

(4) Passwords;

(5) Financial instrument transactions;

(6) Transfers of funds;

(7) Player tracking information;

(8) Download Packages; and

(9) Any information that affects game outcome.

(b) *Wireless communications.* (1) Wireless access points must not be accessible to the general public.

(2) Open or unsecured wireless communications are prohibited.

(3) Wireless communications must be secured using a methodology that makes eavesdropping, access, tampering, intrusion or alteration impractical. By way of illustration, such methodologies include encryption, frequency hopping, and code division multiplex access (as in cell phone technology).

(c) Methodologies must be used that will ensure the reliable transfer of data and provide a reasonable ability to detect and act upon any corruption of the data.

(d) Class II gaming systems must record detectable, unauthorized access or intrusion attempts.

(e) Remote communications may only be allowed if authorized by the TGRA. Class II gaming systems must have the ability to enable or disable remote access, and the default state must be set to disabled.

(f) Failure of data communications must not affect the integrity of critical memory.

(g) The Class II gaming system must log the establishment, loss, and re-establishment of data communications between sensitive Class II gaming system components.

§ 547.16 What are the minimum standards for game artwork, glass, and rules?

(a) *Rules, instructions, and prize schedules, generally.* The following must at all times be displayed or made readily available to the player upon request:

(1) Game name, rules, and options such as the purchase or wager amount stated clearly and unambiguously;

(2) Denomination;

(3) Instructions for play on, and use of, the player interface, including the functions of all buttons; and

(4) A prize schedule or other explanation, sufficient to allow a player to determine the correctness of all prizes awarded, including:

(i) The range and values obtainable for any variable prize;

(ii) Whether the value of a prize depends on the purchase or wager amount; and

(iii) The means of division of any pari-mutuel prizes; but

(iv) For Class II Gaming Systems, the prize schedule or other explanation need not state that subsets of winning patterns are not awarded as additional prizes (for example, five in a row does not also pay three in a row or four in a row), unless there are exceptions, which must be clearly stated.

(b) *Disclaimers.* The Player Interface must continually display:

(1) ''Malfunctions void all prizes and plays'' or equivalent; and

(2) ''Actual Prizes Determined by Bingo (or other applicable Class II game) Play. Other Displays for Entertainment Only'' or equivalent.

(c) Odds notification. If the odds of winning any advertised top prize exceeds 100 million to one, the Player Interface must display: ''Odds of winning the advertised top prize exceeds 100 million to one'' or equivalent.

§ 547.17 How does a TGRA apply to implement an alternate minimum standard to those required by this part?

(a) *TGRA approval.* (1) A TGRA may approve an alternate standard from those required by this part if it has determined that the alternate standard will achieve a level of security and integrity sufficient to accomplish the purpose of the standard it is to replace. A gaming operation may implement an alternate standard upon TGRA approval subject to the Chair's decision pursuant to paragraph (b) of this section.

(2) For each enumerated standard for which the TGRA approves an alternate standard, it must submit to the Chair